

CLAIMS

What is claimed is:

1. A method of finger placement in a RAKE receiver comprising:
receiving a composite signal that includes one or more signal images;
generating a multipath delay profile for the composite signal over a defined search window at a first delay resolution; and
determining delay assignments for placement of one or more fingers of the RAKE receiver within the search window based on a second delay resolution that is independent of the first delay resolution.
2. The method of claim 1, wherein determining delay assignments for placement of one or more fingers of the RAKE receiver within the search window based on a second delay resolution that is independent of the first delay resolution comprises determining which grid points in a finger placement grid comprising a plurality of grid points uniformly spaced according to the second delay resolution most closely coincide with one or more strongest measurements in the multipath delay profile.
3. The method of claim 1, further comprising placing at least one finger of the RAKE receiver at a delay assignment that does not correspond to a measurement point in the multipath delay profile.
4. The method of claim 1, wherein generating a multipath delay profile for the composite signal over a defined search window at a first delay resolution comprises generating a sample set of values based on correlation measurements taken at measurement points within the search window, said measurement points being uniformly spaced apart based on the first delay resolution.

5. The method of claim 4, wherein determining delay assignments for placement of one or more fingers of the RAKE receiver within the search window based on a second delay resolution that is independent of the first delay resolution comprises:

defining a finger placement grid as a plurality of grid points, said grid points being uniformly spaced according to the second delay resolution and spanning at least a portion of the search window; and

selecting one or more grid points of the finger placement grid for assignment of one or more fingers of the RAKE receiver based on evaluating the multipath delay profile.

6. The method of claim 5, wherein selecting one or more grid points in the finger placement grid for assignment of one or more fingers of the RAKE receiver based on evaluating the multipath delay profile comprises determining grid point qualities for one or more grid points in the finger placement grid and setting placement delays for one or more fingers based on comparing the grid point qualities.

7. The method of claim 1, wherein receiving a composite signal comprises receiving a composite signal on each of two or more receiver antennas.

8. The method of claim 7, wherein generating a multipath delay profile for the composite signal over a defined search window at a first delay resolution comprises generating a multipath delay profile for each composite signal.

9. The method of claim 8, wherein determining delay assignments for placement of one or more fingers of the RAKE receiver within the search window based on a second delay resolution that is independent of the first delay resolution comprises:

defining a finger placement grid for each composite signal; and

assigning one or more fingers of the RAKE receiver to grid points in each finger placement grid based on evaluating the multipath delay profile of each composite signal.

10. The method of claim 7, wherein generating a multipath delay profile for the composite signal over a defined search window at a first delay resolution comprises generating a joint multipath delay profile for the two or more composite signals received on the two or more receiver antennas.

11. The method of claim 10, wherein determining delay assignments for placement of one or more fingers of the RAKE receiver within the search window based on a second delay resolution that is independent of the first delay resolution comprises determining delay assignments based on the joint multipath delay profile.

12. The method of claim 7, wherein determining delay assignments for placement of one or more fingers of the RAKE receiver within the search window based on a second delay resolution that is independent of the first delay resolution comprises:

generating a multipath delay profile for each composite signal;
determining a grid point quality for one or more grid points in the finger placement grid based on each multipath delay profile;
summing the grid point qualities determined for each of the one or more grid points to generate combined grid point qualities; and
identifying selected grid points of the finger placement grid for assigning fingers of the RAKE receiver based on the combined grid point qualities.

13. The method of claim 12, wherein summing the grid point qualities determined for each of the one or more grid points to generate a combined grid point qualities comprises summing grid

point qualities corresponding to substantially the same delay values among the multipath delay profiles.

14. The method of claim 1, wherein receiving a composite signal that includes one or more signal images comprises receiving two or more composite signals, each corresponding to a different transmit antenna.

15. The method of claim 14, wherein generating a multipath delay profile for the composite signal over a defined search window at a first delay resolution comprises generating a multipath delay profile for each composite signal.

16. The method of claim 15, wherein determining delay assignments for placement of one or more fingers of the RAKE receiver within the search window based on a second delay resolution that is independent of the first delay resolution comprises:

defining a finger placement grid for each composite signal; and
assigning one or more fingers of the RAKE receiver to grid points in each finger placement grid based on evaluating the multipath delay profile of each composite signal.

17. The method of claim 15, wherein determining delay assignments for placement of one or more fingers of the RAKE receiver within the search window based on a second delay resolution that is independent of the first delay resolution comprises:

defining a common finger placement grid;
determining point qualities of one or more grid points of the finger placement grid for each multipath delay profile; and
identifying one or more selected grid points for assigning fingers of the RAKE receiver based on jointly evaluating the point qualities determined for the multipath delay profiles.

18. The method of claim 15, wherein determining delay assignments for placement of one or more fingers of the RAKE receiver within the search window based on a second delay resolution that is independent of the first delay resolution comprises:

generating a common finger placement grid;
determining a grid point quality for one or more grid points in the finger placement grid based on each multipath delay profile;
summing the grid point qualities determined for each of the one or more grid points to generate combined grid point qualities; and
identifying selected grid points of the finger placement grid for assigning fingers of the RAKE receiver based on the combined grid point qualities.

19. The method of claim 18, wherein summing the grid point qualities determined for each of the one or more grid points to generate combined grid point qualities comprises summing grid point qualities corresponding to substantially the same delay values among the multipath delay profiles.

20. A method of finger placement in a RAKE receiver comprising:
receiving a composite signal that includes one or more signal images;
generating a multipath delay profile for the composite signal based on a searcher delay grid defined within a search window;
defining a finger placement grid for positioning fingers of the RAKE receiver within the search window that is independent of the searcher delay grid; and
placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile.

21. The method of claim 20, wherein generating a multipath delay profile for the composite signal based on a searcher delay grid defined within a search window comprises generating a power/delay profile (PDP) for the composite signal.
22. The method of claim 20, wherein defining a finger placement grid for positioning fingers of the RAKE receiver within the search window comprises defining a set of placement grid points at a delay resolution smaller than the searcher delay grid.
23. The method of claim 20, wherein placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile comprises placing all of a desired plurality of fingers on grid points of the finger placement grid.
24. The method of claim 20, further comprising placing at least one finger of the RAKE receiver off-grid with respect to the finger placement grid such that the RAKE receiver operates with at least one finger placed on-grid and at least one finger placed off-grid.
25. The method of claim 20, wherein defining a finger placement grid for positioning fingers of the RAKE receiver within the search window comprises defining a plurality of spaced apart delay points within at least a portion of the search window that have a grid resolution based on a Nyquist value associated with the composite signal.
26. The method of claim 25, wherein defining a plurality of spaced apart delay points within at least a portion of the search window that have a grid resolution based on a Nyquist value associated with the composite signal comprises defining sub-chip spaced grid points within the search window.

27. The method of claim 20, wherein defining a finger placement grid for positioning fingers of the RAKE receiver within the search window comprises:
 - defining at least first and second finger placement grids, each spanning a portion of the search window; and
 - placing at least a first finger on a grid point within the first finger placement grid and
 - placing at least a second finger on a grid point within the second finger placement grid.
28. The method of claim 27, further comprising:
 - identifying image clusters in the multipath delay profile; and
 - spanning at least a portion of a first image cluster with the first finger placement grid and
 - spanning at least a portion of a second image cluster within the second finger placement grid, such that the at least first finger is positioned at a delay time falling within the first image cluster and the at least second finger is positioned at a delay time falling within the second image cluster.
29. The method of claim 28, further comprising aligning a grid point within the first finger placement grid at a desired position relative to the first image cluster, and aligning a grid point within the second finger placement grid at a desired position relative to the second image cluster.
30. The method of claim 20, further comprising operating the RAKE receiver in a mixed placement mode by placing at least one other finger of the RAKE receiver at a delay position that does not correspond to a grid point of the finger placement grid.
31. The method of claim 30, further comprising determining whether to operate in the mixed placement mode based on evaluating the multipath delay profile.

32. The method of claim 20, wherein placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile comprises:

- identifying candidate grid points on the finger placement grid by determining which grid points on the finger placement grid lie closest to measurement peaks within the multipath delay profile that exceed a defined measurement threshold; and
- assigning one or more fingers to delay values corresponding to one or more of the candidate grid points.

33. The method of claim 20, wherein placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile comprises:

- identifying qualified measurement peaks within the multipath delay profile by comparing the measurement peaks to one or more measurement thresholds;
- forming a set of candidate grid points on the finger placement grid by considering those grid points closest to the qualified measurement peaks;
- calculating a quality for each candidate grid point; and
- placing fingers at delay values corresponding to the N best candidate grid points, wherein N denotes a desired number of fingers to be assigned.

34. The method of claim 20, wherein placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile comprises:

- identifying a largest measurement in the multipath delay profile that exceeds a defined measurement threshold;
- assigning a finger to a grid point on the finger placement grid that substantially coincides with that largest measurement, if any such grid point exists; and
- if no grid point on the finger placement grid substantially coincides with the largest measurement, assigning one or more fingers to one or more grid points on the finger placement grid that are closest to the largest measurement.

35. The method of claim 34, wherein assigning one or more fingers to one or more grid points on the finger placement grid that are closest to the largest measurement comprises assigning fingers to the M best grid points of L grid points on the finger placement grid, wherein M can be less than L, and wherein both M and L are numbers equal to or greater than one.

36. The method of claim 20, wherein placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile comprises:
identifying a maximum measurement in the multipath delay profile;
aligning a grid point of the finger placement grid with the maximum measurement; and
placing a finger of the RAKE receiver on the grid point that is aligned with the maximum measurement.

37. The method of claim 20, wherein placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile comprises:
identifying one or more energy clusters in the multipath delay profile;
ranking the one or more energy clusters according to a cluster quality determined for each of the one or more energy clusters;
defining a first finger placement grid for a highest ranked energy cluster;
aligning a grid position of the first finger placement grid to a maximum measurement within the highest ranked cluster; and
assigning a finger of the RAKE receiver to that grid position in the first finger placement grid.

38. The method of claim 37, further comprising:

ranking grid point qualities of remaining grid positions in the first finger placement grid;

assigning remaining fingers of the RAKE receiver to as many remaining grid positions in the first finger placement grid as have a grid point quality above a defined quality threshold; and

assigning one or more remaining fingers of the RAKE receiver to a next highest ranked cluster if not all fingers of the RAKE receiver are assigned within the highest ranked cluster.

39. The method of claim 38, wherein assigning one or more remaining fingers of the RAKE receiver to a next highest ranked cluster if not all fingers of the RAKE receiver are assigned within the highest ranked cluster comprises:

defining a second finger placement grid for the next highest ranked cluster;

aligning a grid position of the second finger placement grid to a maximum measurement within the next highest ranked cluster; and

assigning a finger of the RAKE receiver to that grid position in the second finger placement grid.

40. The method of claim 20, wherein defining a finger placement grid for positioning fingers of the RAKE receiver within the search window that is independent of the searcher delay and placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile together comprise:

identifying one or more energy clusters within the multipath delay profile;

ranking the energy clusters based on determining cluster qualities;

tuning a first finger placement grid to a highest ranked energy cluster and assigning one or more fingers of the RAKE receiver to grid positions within that first finger placement grid; and

if any fingers remain unassigned, tuning a second finger placement grid to a next highest ranked energy cluster and assigning one or more of the remaining fingers to grid positions within that second finger placement grid.

41. The method of claim 40, further comprising, if any fingers remain unassigned after making assignments to grid positions within the second finger placement grid, tuning a third finger placement grid to a next highest ranked energy cluster and assigning one or more of the remaining fingers to grid positions within that third finger placement grid.

42. The method of claim 40, wherein the first and second finger placement grids have different grid resolutions.

43. The method of claim 20, wherein placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile comprises: identifying one or more energy clusters in the multipath delay profile; aligning the finger placement grid with a highest ranked one of the energy clusters; and assigning one or more fingers of the RAKE receiver to grid positions in the finger placement grid.

44. The method of claim 43, wherein assigning one or more fingers of the RAKE receiver to grid positions in the finger placement grid comprises: assigning fingers to grid positions within the highest ranked energy cluster with point qualities exceeding a defined quality threshold; and assigning any remaining fingers to grid positions within energy clusters other than the highest ranked energy cluster that exceed the defined quality threshold.

45. The method of claim 20, wherein placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile comprises:

identifying two or more energy clusters in the multipath delay profile;
comparing point qualities of grid points in one or more finger placement grids between
the two or more clusters; and
assigning fingers of the RAKE receiver to the highest quality grid points among the two
or more energy clusters.

46. The method of claim 20, wherein placing at least one finger of the RAKE receiver on a grid point of the finger placement grid based on evaluating the multipath delay profile comprises:
interpolating multipath delay profile values between searcher delay grid points to determine multipath delay profile values corresponding to grid points in the finger placement grid;
determining grid point qualities for one or more candidate grid points in the finger placement grid based on the multipath delay profile values; and
placing one or more fingers of the RAKE receiver at candidate grid points based on the grid point qualities.

47. The method of claim 20, wherein receiving a composite signal that includes one or more signal images comprises receiving a first composite signal associated with a first receive antenna, and receiving a second composite signal associated with a second receive antenna, and wherein the steps of generating a multipath delay profile, defining a finger placement grid, and placing at least one finger of the RAKE receiver on a grid point of the finger placement grid are performed for each of the first and second composite signals.

48. A receiver comprising:

a searcher to generate a multipath delay profile based on a searcher delay grid for a

received signal that includes one or more signal images;

a RAKE receiver to generate a despread signal by despreading the received signal, the

RAKE receiver comprising:

a plurality of fingers to despread received signals at different signal delays; and

a logic circuit to assign one or more fingers of the RAKE receiver to grid points of

one or more finger placement grids based on the multipath delay profile,

said one or more finger placement grids being defined independently from

the searcher delay grid.

49. The receiver of claim 48, wherein the searcher is configured to generate the multipath delay profile as a power/delay profile (PDP) within a search window.

50. The receiver of claim 48, wherein the RAKE receiver is configured to define a finger placement grid comprising a plurality of grid points that span at least a portion of the multipath delay profile but that is independent of measurement points comprising the multipath delay profile.

51. The receiver of claim 48, wherein the RAKE receiver is configured to assign one or more fingers of the RAKE receiver to grid points of one or more finger placement grids based on the multipath delay profile by identifying grid points in the one or more finger placement grids lying closest to signal peaks within the multipath delay profile.

52. The receiver of claim 48, wherein the receiver defines the one or more finger placement grids for positioning fingers of the RAKE receiver within the search window as one or more sets of grid points each comprising at least one grid point that does not correspond to a measurement point in the multipath delay profile.

53. The receiver of claim 48, further comprising a radio front-end to receive a transmitted signal and to provide the received signal as a baseband signal by downconverting the transmitted signal.

54. The receiver of claim 48, further comprising a demodulator to recover transmitted information from the despread received signal output by the RAKE receiver.

55. The receiver of claim 48, wherein the receiver comprises a portion of a wireless communication device.

56. The receiver of claim 48, wherein the logic circuit of the RAKE receiver comprises at least a portion of an Integrated Circuit (IC).

57. The receiver of claim 48, wherein the receiver is configured to:
interpolate between measurement values in the multipath delay profile to obtain
interpolated measurements corresponding to grid points in the one or more finger placement grids;
determine point qualities for one or more candidate grid points of the one or more finger placement grids based on the interpolated measurements; and
assign fingers to one or more of the candidate grid points based on the point qualities.

58. The receiver of claim 48, wherein the receiver is configured to operate in a mixed finger placement mode, wherein the receiver places at least one active finger on-grid with respect to the one or more finger placement grids and places at least one active finger off-grid with respect to the one or more finger placement grids.

59. The receiver of claim 58, wherein the receiver is configured to selectively operate in the mixed finger placement mode based on evaluating the multipath delay profile.

60. The receiver of claim 48, wherein the receiver is configured to:
 - identify energy clusters in the multipath delay profile; and
 - align at least a first finger placement grid based on a first selected energy cluster.
61. The receiver of claim 60, wherein the receiver is configured to:
 - position the first finger placement grid based on the first selected energy cluster;
 - extend the grid positions of the first finger placement grid to cover one or more other clusters; and
 - assign fingers to grid positions corresponding to the first selected cluster and, optionally, to the one or more other clusters.
62. The receiver of claim 60, wherein the receiver is configured to:
 - align one or more additional finger placement grids with respective ones of one or more other selected energy clusters;
 - position the one or more additional finger placement grids based on the one or more other selected energy clusters; and
 - assign fingers to grid positions in any one or all of the first finger placement grid and the one or more additional finger placement grids.
63. The receiver of claim 48, wherein the receiver is configured to:
 - define at least first and second finger placement grids, each spanning a portion of a search window; and
 - placing at least a first finger on a grid point within the first finger placement grid and
 - placing at least a second finger on a grid point within the second finger placement grid.

64. The receiver of claim 63, wherein the receiver is configured to:
 - identify image clusters in the multipath delay profile; and
 - span at least a portion of a first image cluster with the first finger placement grid and
 - span at least a portion of a second image cluster within the second finger placement grid, such that the at least first finger is positioned at a delay time falling within the first image cluster and the at least second finger is positioned at a delay time falling within the second image cluster.
65. The receiver of claim 64, wherein the receiver is configured to align a grid point within the first finger placement grid at a desired position relative to the first image cluster, and align a grid point within the second finger placement grid at a desired position relative to the second image cluster.
66. The receiver of claim 48, wherein the logic circuit comprises a processor circuit.
67. The receiver of claim 48, wherein the RAKE receiver comprises a Generalized RAKE (G-RAKE) receiver.
68. The receiver of claim 48, wherein the receiver is configured to:
 - determine a point quality for one or more grid points in a finger placement grid based on the multipath delay profile; and
 - assign fingers of the RAKE receiver to grid points in the finger placement grid based on the determined point qualities.
69. The receiver of claim 48, wherein the receiver is configured to:
 - identify candidate grid points in a finger placement grid based on thresholding a measurement value obtained from the multipath delay profile for one or more grid points;

determine point qualities for the candidate grid points; and
assigning fingers to one or more of the candidate grid points based on ranking the
determined point qualities.

70. The receiver of claim 48, wherein the receiver is configured to place at least one finger of the RAKE receiver on a grid point of a finger placement grid based on interpolating multipath delay profile values between searcher delay grid points to determine multipath delay profile values corresponding to grid points in the finger placement grid.

71. The receiver of claim 48, wherein the receiver includes first and second receive antennas, and wherein the receiver is configured to assign one or more fingers to a first received signal associated with the first receive antenna and to assign one or more fingers to a second received signal associated with the second receive antenna such that the receiver uses at least one first finger placement grid for the first antenna and at least one second finger placement grid for the second antenna.

72. A program in a computer-readable media comprising instructions to instruct a processor to:

evaluate a multipath delay profile comprising a plurality of measurement values for a received signal taken at corresponding measurement points;
define a finger placement grid comprising a plurality of grid points that span at least a portion of the multipath delay profile and that are independently spaced apart relative to the measurement points of the multipath delay profile; and
determine delay assignments for one or more fingers of a RAKE receiver corresponding to one or more selected grid points of the finger placement grid based on evaluating the multipath delay profile.

73. The program of claim 72, further comprising instructions to instruct the processor to tune the finger placement grid by aligning at least one grid point of the finger placement grid with at least one measurement point of the multipath delay profile.

74. The program of claim 72, further comprising instructions to instruct the processor to define two or more finger placement grids and to select at least one grid point from each of the two or more finger placement grids for determining the corresponding delay assignments of two or more fingers of the RAKE receiver.

75. The program of claim 72, further comprising instructions to instruct the processor to define at least one additional finger placement grid, such that the processor uses at least first and second finger placement grids in determining delay assignments.

76. The program of claim 75, further comprising instructions to instruct the processor to tune the first finger placement grid to a first measurement point in the multipath delay profile, and to tune the second finger placement grid to a second measurement point in the multipath delay profile.

77. The program of claim 72, wherein instructions to determine delay assignments for one or more fingers of a RAKE receiver corresponding to one or more selected grid points of the finger placement grid based on evaluating the multipath delay profile comprise instructions to:

determine a grid point quality for each of two or more grid points in the finger placement grid; and

select one or more grid points for assigning a finger placement to one or more fingers of the RAKE receiver based on comparing the grid point qualities.

78. A mobile terminal comprising:

- a transmitter to transmit wireless signals; and
- a receiver to receive wireless signals, said receiver comprising a RAKE receiver configured to:
 - generate a finger placement grid that is independent of a searcher grid used to generate a multipath delay profile for a received signal;
 - evaluate one or more grid points of the finger placement grid based on the multipath delay profile to identify one or more selected grid points of the finger placement grid; and
 - assign delay settings of one or more fingers of the RAKE receiver corresponding to the one or more selected grid points.

79. The mobile terminal of claim 78, wherein the receiver is configured to generate the finger placement grid as a plurality of uniformly spaced delay positions that span at least a portion of the multipath delay profile.

80. The mobile terminal of claim 79, wherein the receiver is configured to generate two or more finger placement grids and to assign delay settings to two or more RAKE fingers corresponding to selected grid points in two or more of the finger placement grids.

81. The mobile terminal of claim 78, wherein the receiver is configured to evaluate one or more grid points of the finger placement grid based on the multipath delay profile to identify one or more selected grid points of the finger placement grid by determining which grid points lie closest to one or more measurement peaks in the multipath delay profile.

82. The mobile terminal of claim 78, wherein the receiver is configured to generate interpolated measurement values corresponding to grid points lying between measurement points of the multipath delay profile, and to compare one or more interpolated values to determine grid point qualities for those grid points, said grid point qualities being used to identify the selected grid points of the finger placement grid.

83. The mobile terminal of claim 82, wherein the receiver is configured to determine a grid point quality for any grid points that align with measurement points in the multipath delay profile directly based on the measurement values in the multipath delay profile that correspond to those grid points.

84. The mobile terminal of claim 78, wherein the receiver is configured to operate in a mixed placement mode wherein at least one finger is assigned to a grid point of the finger placement grid and at least one finger is assigned to a delay position that does not correspond to a grid point in the finger placement grid.

85. The mobile terminal of claim 78, wherein the receiver is configured to operate in a non-grid mode on a selective basis, and wherein the finger placement grid is not used to place fingers in the non-grid mode, and further wherein the receiver is configured to select the non-grid mode based on evaluating the multipath delay profile.

86. A base station comprising:

 a transmitter to transmit wireless signals; and

 a receiver to receive wireless signals, said receiver comprising a RAKE receiver configured to:

 define a finger placement grid for placement of one or more fingers of the RAKE receiver that is independent of a searcher grid used to generate a multipath delay profile for a received signal.

 identify one or more selected grid points by evaluating grid points of the finger placement grid based on the multipath delay profile; and

 assign delay settings corresponding to the selected grid points to one or more of the fingers of the RAKE receiver.

87. The base station of claim 86, wherein the receiver is configured to define the finger placement grid as a plurality of uniformly spaced delay positions that span at least a portion of the multipath delay profile.

88. The base station of claim 87, wherein the receiver is configured to define two or more finger placement grids and to assign delay settings to two or more RAKE fingers corresponding to selected grid points in two or more finger placement grids.

89. The base station of claim 86, wherein the receiver is configured to identify one or more selected grid points grid by evaluating grid points of the finger placement grid based on the multipath delay profile by determining which grid points of the finger placement grid lie closest to one or more measurement peaks in the multipath delay profile.

90. The base station of claim 86, wherein the receiver is configured to generate interpolated multipath delay profile measurement values corresponding to grid points of the finger placement grid lying between measurement points of the multipath delay profile, and to compare one or more interpolated values to determine grid point qualities for those grid points, said grid point qualities being used to identify the selected grid points.

91. The base station of claim 90, wherein the receiver is configured to determine a grid point quality for any grid points that align with measurement points in the multipath delay profile directly based on the measurement values in the multipath delay profile that correspond to those grid points.

92. The base station of claim 86, wherein the receiver is configured to operate in a mixed placement mode wherein at least one finger is assigned to a grid point of the finger placement grid and at least one finger is assigned to a delay position that does not correspond to a grid point in the finger placement grid.

93. The base station of claim 86, wherein the receiver is configured to operate in a non-grid mode on a selective basis, and wherein the finger placement grid is not used to place fingers in the non-grid mode, and further wherein the receiver is configured to select the non-grid mode based on evaluating the multipath delay profile.